THE ZOOLOGIST

No. 864.—June 15th. 1913.

WITH THE WHALERS AT DURBAN, AND A FEW NOTES ON THE ANATOMY OF THE HUMP-BACK WHALE (*MEGAPTERA BÖOPS*).*

By Thomas B. Goodall, F.R.C.V.S., F.L.S.

(Plate I.)

There is some difficulty in getting out in the whaling boats; neither the captain nor the crew care to be troubled with strangers, and for many reasons, the first being that no one but a very good sailor could stand the rough-and-tumble of these small boats on a rough sea without being unwell. When they are after a Whale none of them has time to look after a sick person, while, as the steamers have only the flimsiest of bulwarks, anything might happen to one in the throes of *mal-de-mer*; so they do not care to take the risk. Again, a too inquisitive person is apt to be getting in the way at a critical time in the shooting or securing the Whale.

I was fortunate in having made the friendship of a gentleman who held a large number of shares in one of the whaling companies. With the usual urbanity of the colonist (and really I received nothing but kindness from all during my long stay in South Africa), he was not satisfied to give me only a note of introduction, but went down himself and gave me a personal introduction to the captain of the 'Urnau,' and also to the manager of the factory, and I was thus not only welcomed on the steamer, but every facility was given me to see the cutting up of the Whales, and with the able assistance of Mr. Imeson, Jun., the manager's son, and Mr. Scott, the secretary, I was enabled to make some notes on the anatomy of these strange mammals.

---

* This species has been previously referred to in these pages (190[illegible], p. 54) as *Megaptera longimana*.

The boats—small steamers of from 80 to 100 tons—go out before daylight, and, as it was impossible to obtain sleeping accommodation on them, I put up for a few nights at a small hotel, 'The Public House Trust,' on the bluff, close to the shipping and whaling stations, in order to avoid the waste of time in going to and from the town, and thus I was amongst the Whales from sunrise to dark. After the first day, when I exchanged with the captain and mate my luncheon of sandwiches and cake for a plain sailor's meal of boiled pork and pea-soup, I was made quite one of them, for by these signs they were satisfied that I was not likely to give them trouble, at any rate with sea-sickness.

I was aboard before the crew was well awake, and had a cup of coffee with the skipper as we slipped away from our moorings at nooi-dag;* then up on the bridge to look out for Whales. No words can describe the glory of the rising sun in these regions; it is sublimely grand. As it had been blowing hard the day before, there was a big "swell" on and a rough sea, and we were making similar weather to what the little 'Telegraph' used to do in the winter time from Poole to Swanage in the old days.

There are, I believe, nine of these steamers belonging to the two companies, and as they steam out of the harbour, between the bluff and the breakwater, they spread out fan-fashioned, and everyone is at once on the *qui vive* for the Whales, for they come quite close into the shore.

We soon sighted a pair of Whales (the skipper told me that they generally go in pairs), and gave chase. We got within range and fired, but owing to the tossing of the boat, the muzzle of the gun was too much elevated, and the harpoon passed over them; their sense of hearing must be fairly good, for they immediately dived, coming right under the boat, making their way astern, and eventually dodged us. I had no idea before how crafty these huge creatures can be; this is no doubt engendered by the constant harrying they get from the whalers. Two or three others also slipped away from us in the same way, but at last we got on the tracks of a single Whale, which kept

---

* A Dutch colonial word to be roughly translated as the hour before dawn, when there is seen the first red streak in the eastern horizon.

BRITISH MUSEUM

us on the chase for an hour, but which we at last secured. We saw him "blow," and, noting the line he was making, we got on his wake and followed it. I timed his longest "sounding" (the time he was under the water) as eight minutes, and then he would come to the surface and take from four to eight short "soundings." As we pressed on his wake, he kept almost close under the surface, so that the man in the "crow's nest" could see him and direct the helmsman, and every move of the Whale being thus followed, we at last came up to him, just as he was forced to come to the surface for his "blow," and the harpoon was driven well home.

In these chases the great thing to avoid was not over-running the Whale when he takes his deep "soundings," or he will start off in an opposite direction; so we often brought up and waited rather than risk the alternative.

The harpoons and the harpoon-guns are very clever contrivances. The harpoon itself is a heavy instrument, as much as two men can lift, the shaft having a long groove in it, in which runs a wire grummit, to which the rope from the ship is attached. When the harpoon is in the gun the grummit hangs down in front of the muzzle, so that when it is fired the grummit slides down the groove to the base of the shaft, which is made to just fit the barrel of the gun, and on which the charge of powder exerts its force. The harpoon has a four-sided arrow-head, about 8 in. long and 3 in. in diameter at its base. This is made of a cast metal, and has in it a small charge of dynamite, which is timed to explode three seconds after the harpoon is fired from the gun. This cast-metal head is screwed on to the harpoon proper, and of course goes to pieces with the explosion in the Whale's body, and a new one is screwed on after each shot.

I might mention here that skilled blacksmiths are constantly employed at the factories in straightening out and repairing the harpoons as they are dug out of the Whales' bodies, and they are sometimes twisted about to a greater degree than would be thought possible. A gauge is kept at the factory of the same size as the gun-barrel, and each repaired harpoon is passed through it.

Behind the screwed-on head, and on the harpoon proper, are four flanges working on hinges, which are tied back to the shaft with rope-yarn. After the harpoon has entered the body, as the first strain comes on the rope, the yarn breaks, the flanges open out, and give a very sure and strong hold on the Whale, the rope paying out with the harpoon. The gun itself is very strong and heavy, and works on an easy swivel on a small platform in the extreme bows of the boat; it can be turned about to fire not only ahead but on either side of the boat. The captain always takes charge of the gun.

The stricken Whale first plunges, and then, coming to the surface, violently thrashes the water with his powerful flukes. I have seen one turn over and over and over till he got turn after turn of the rope round his body, then he gives two or three violent grunts, almost like roars, whistling as the expirations become feebler, followed by a violent quiver or "flurry," and all is over. The carcase is now hauled in to the ship, and a chain is passed round the body where it is thinnest, just in front of the "flukes," which are cut off to facilitate towing, and then we steam away to the whaling station or factory, where we leave the carcase, and at once go out to sea again (Plate I. fig. 1). One boat will sometimes capture three or four Whales in a day.

There are powerful steam-windlasses at the station, for the steamer leaves the Whale in the water at the foot of a slanting platform, up which the body is dragged, tail first, by the windlass. A wide and large railway-truck platform runs in on rails to the exact level of the top of the slanting platform, on which the body is dragged by the help of the steam-windlass, pulleys, and wire ropes and chains. The engine is attached to the truck, and it is taken by a short railway round the head of the bluff to the cutting up and boiling works, which are out on the open sea-beach. Here the cutting up and boiling is always going on—an interesting process!

Nearly all the Europeans employed both on the boats and at the factories are Norwegians, though there are also Englishmen, and Scottish engineers, of course. The captains and crews of the boats are paid a "living" wage, but they get a bonus for every Whale captured. There are about one hundred Kafirs employed in each factory for cutting up the Whales, and twenty-five at work at a time to each Whale. They have day and night shifts, and it is an interesting sight to see them working, with their scant clothing consisting of nothing but a waist-cloth; but they appear to revel in the blood and grease.

When I called at the factory just before sailing for home at the beginning of November, I was told that the Union Company had taken about 460 Whales in the season, and the South African about 490, of which my boat, the 'Urnau,' had accounted for 130, and headed the list of all boats for the season.

NOTES TAKEN AT THE WHALING FACTORY, DURBAN, AUGUST 31ST, 1911.

Female Humpback Whale (*Megaptera böops*), 60 ft. long.—Standing by the side of this Whale as she lay on her abdomen, I should say the top of the back was about 9 ft. from the ground.

The upper part of the body is uniformly black, the under surface is white, marbled with black streaks and blotches; this is also the colour of the large plicæ under the throat and lower jaw; the upper part of the "flippers" is also black, the under part white.

Note.—The model of the *Megaptera* in the Natural History Museum, South Kensington, is much too dark on its under surface; it should be, as stated above, white, marbled with black streaks and blotches. This was the colour of all the Humpbacks I saw at Durban.

The "flippers" are 12 ft. long, sometimes more, and 3 ft. across at their widest part; there is a row of tubercles on their anterior margins, which are rounded, the posterior margins being thin. The tubercles give the anterior margins a serrated appearance (Plate I. fig. 2).

These tubercles are found also round the anterior margin of the lower jaw, and rows of them on the face and upper jaw; I cut into some of them, and found they were merely composed of "blubber" and skin.

Every Whale caught is infested with barnacles; they are numerous round the jaws, on the flippers, and always round the genital sheath. Some of these barnacles (*Balanus coronula*) are as much as an inch and a half in diameter, and they are embedded in the skin. There were several large wounds in the skin of this Whale, some on the upper part and sides of the body, which, I was told, were due to the rubbing off of old barnacles which had been embedded in the skin at these spots.

There are twelve large plicæ on either side of the under surface of the lower jaw; they extend backwards to within four feet of the genital sheath, and in young Whales they terminate in a central spiral. Their function seems to be to allow great expansion of the skin, both in the act of swallowing and in respiration.

The large transverse processes of the vertebræ extend practically, after the region of the neck, from end to end of the body, in the median line between the summit of the back and the floor of the abdomen. All the vital parts are below this line, and are never exposed above the surface of the water in "blowing." Though I never saw it myself, it is said that these Whales will sometimes leap right out of the water in play. All the upper part of the body—that is, all above the transverse processes—is made up of the huge dorsal, lumbar, and caudal muscles, and is not directly vital if struck with the harpoon. If this were borne in mind, and the harpoon was always fired sufficiently low, a struck Whale would never require a second harpoon.

Palate and Baleen-plates.—I cannot quite reconcile my notes and observations with the description of the relationship of these parts and structures to one another found in most text-books, as in Flower & Lydekker's 'Mammals Living and Extinct.' I will describe the parts separately.

The palate proper is about eighteen inches wide. Just inside the inner edges of the baleen plates, or "finners" as they are called by the whalers, there is, first, on either side, a raised longitudinal rounded ridge, formed by a thick fold of mucous membrane, which apparently can be raised and depressed; inside these folds, which are, presumably, the analogues of the gums, there is, on either side, a deep fissure separating the gums from the palate proper. The folds or gums mentioned above extend back for about half the length of the mouth, and the palate proper, depressed between the gums at its anterior part, gradually takes the form of a rounded ridge, two feet high from the bases of the "finners," behind the lips or gums, and the ridge is about six inches wide on its summit.

Note.—The ridges of mucous membrane inside the mouth are in the position of the gums, but they are mobile, and they may be a huge inverted upper lip, but whatever part of the anatomy of these strange mammals they represent, they separate the bases of the "finners" and the "finners" themselves from the palate proper.

Baleen-plates or "Finners."—As stated above, these appear to me to be quite distinct from the palate, and seem to correspond rather to the papillæ found on the inner surfaces of the cheeks of many animals, notably the ruminants, than to be processes from the buccal membrane of the palate, for, if my description of the palate is correct, they are outside the gums and inside the cheeks; or, if the ridge of mucous membrane is an inverted lip, they are really modified hairs of a veritable moustache on an inverted upper lip. These "finners" hang down inside the cheeks; they are sharp and smooth on their outer-edges, and the inner-edges are frayed out into coarse brown hairs in this particular species of Whale (in the Right Whale they are as fine as silk); they are broad at their bases, eight inches across in the centre of the series. They grow from a matrix of dense fibro-elastic material, and, except at the anterior part, the finners are half an inch apart at their bases. They are quite close together at the anterior part of the series, where they take the form of hairs, five inches long; behind these hairs are very small or rudimentary plates, which gradually increase in length to the centre of the series, where they are from four to five feet long. They commence to shorten abruptly from about two feet from the posterior margin of the mouth, and with the shortening they begin to converge, and towards the throat they are continued across the palate as a patch of veritable hairs on either side; these patches of hair are separated from each other centrally by a smooth surface only three inches across at the extreme posterior part of the mouth. Where the plates begin to shorten they become, as it were, broken up into four or five pieces instead of the one plate, and these give way later to the hairs; at this part of the series there are several rudimentary or the commencement of the growth of new plates in evidence. There are from seven hundred to eight hundred "finners" on either side, and their frayed edges, forming the hairs all along their inner edges, extend from the pointed tips to their bases. The Whale's mouth has the appearance of being full of coarse brown hairs! The "finners" are black.

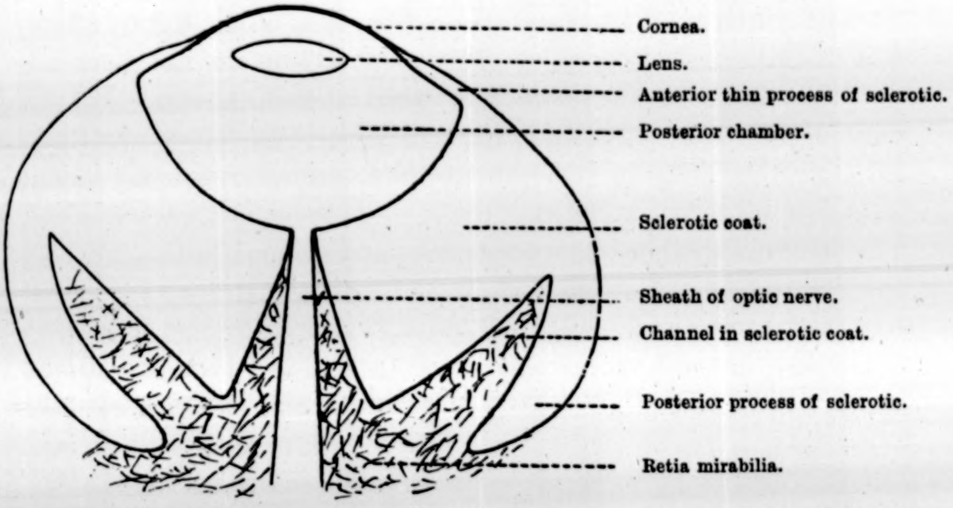
The tongue is black in colour, very soft, and looks not unlike a huge bagful of soft spongy tissue. After the head had been separated from the body, from its posterior part, I could just pass my fist through the gullet to the mouth.

I have stated before that there are several large tubercles on the face; these are here placed on longitudinal ridges. One of these ridges is centrally situated, and the anterior nares are behind this ridge, where there is a central depression, and the two openings, each about a foot long and elliptical, and going out posteriorly from the centre at an angle of 45°, is surrounded by roughened skin, probably sensitive; on either side are a pair of lips.

I have had the opportunity of seeing a wounded Whale "blow" at quite close quarters, not more than twenty feet away, and this occurs: in the act of expiration these "lips" are erected on either side, and then directly after the inspiration they fall over the openings, and thus effectually close them.

The true skin is about a quarter of an inch thick; it is very elastic and springy, like indiarubber. It appears to be composed of columnar rods or tubes, which are arranged vertically from the body outwards (probably, in life, oil exudes from the blubber through these tubes, thus keeping the skin perpetually coated with oil). It is very firmly adherent to the blubber by connective tissue, and it is covered by a thin layer of epidermis, which readily peels off in large flakes after a short exposure of the body to the air. When a piece of skin has been soaked for a couple of days in cold water, the pigment is extracted, and the water becomes dark, almost black in colour.

There are distinct flabby eyelids six or eight inches long; there is a rete mirabile inside the lids, and also at the posterior part of the eyeball. These retia mirabilia are found at all parts of the Whale's body; they even surround the intestine, and are no doubt concerned in the purification of the blood in the long respiratory acts. The eyeball is four inches across by two and a half inches deep; the cornea is one inch and a half across by one inch and one-eighth in the perpendicular measurement. The lens is only three-quarters of an inch across by half an inch deep from front to back. The sclerotic coat, in section, is thin at its anterior margin, then it suddenly thickens to over an inch through, and at its posterior part each side folds in to form the passage for the optic nerve, which is small, leaving an open space at the posterior part of the eyeball, filled in by a venous plexus, or rete mirabile; besides this there is a distinct channel in the thick sclerotic, and circumscribing the eye, also filled in with a venous plexus. What a superb specialization all this is to resist the pressure of sea-water, especially when the animal is going at speed in deep water! The posterior chamber of the eye is two inches across, and not more than two ounces capacity


Cornea.
Lens.
Anterior thin process of sclerotic.
Posterior chamber.
Sclerotic coat.
Sheath of optic nerve.
Channel in sclerotic coat.
Posterior process of sclerotic.
Retia mirabilia.

Section of the eye of Humpback Whale (*Megaptera böops*), to show the great thickness of sclerotic coat; the space at its posterior part and the channels in it filled with retia mirabilia.

The only evidence of an ear in the outer part of the body is a small longitudinal slit, half an inch long and about sixteen inches behind and below the eye; but when one cuts into this, what a revelation! It is found that the external auditory meatus passes through a dense mass of yellow fibro cartilage, a foot or so in thickness, from side to side, which seems to indicate that the Whale's ancestors may have had external pinnæ, but that, like the bind limbs, they were found to be in the way; so they have become tucked away under the skin!

The notes of the internal organs following were only made in a perfunctory manner, as the body was being torn and hacked and cut to pieces by the Kafirs—everyone in a hurry—and another Whale on the stage waiting to be cut up, and the stage itself on which the cutting up was in progress was inches deep in dirt, grease, and blood.

The kidney is composed of several hundreds of separate small glands, each of which is about the size of a walnut; these are all contained in a common outer membrane; the whole conglomerate organ is more than three feet long. There was a bunch of about a dozen soft nematode worms in the loose connective tissue of the kidney; each worm was about a foot in length. I had put these on one side for preservation, but in the confusion and grease and blood they were unfortunately lost.

The contents of the stomach consisted of a dark brown substance, of the consistency of thick paint. I could not discriminate any form or shape of any particular organism. In one part of the stomach there was a distinct line of demarcation between the cuticular and the villous portions; on the latter were several raised nodules.

The liver was an immense organ, and though all authorities say the Whale has no gall-bladder, I believe there was one—at any rate, as far as I could make out in the very rough tearing up of the carcase, there was a large bladder adherent to the liver, and in the position of the gall-bladder, of three or four gallons capacity, and containing about this quantity of a dark brown fluid. The contents of the small intestine were semi-fluid, and reddish brown in colour.

The external generative organs are greatly developed; the penis of one Whale I saw measured six feet, but I was told by the manager that they were sometimes quite eight feet long. What I have termed the "genital sheath" is the external opening seen in both male and female of the generative organs; it is longitudinal, and bounded on either side by a rigid lip; it is quite four or five feet long, and is situated on the abdomen, opposite the dorsal fin, about one-third the length of the body from the tail or "flukes." When the male is brought ashore the penis is almost always hanging pendulous from the sheath.

The mammæ of the female are in a depression on either side of the genital sheath. Our captain told me that last season he had taken a cow-whale in the act of parturition, and that the young Whale taken from her, *i. e.* the Whale at birth, measured sixteen feet and weighed two tons. The weight of a Whale is computed at a foot to the ton; a sixty-foot Whale would weigh sixty tons.

A Whale gives, on an average, forty-four barrels of oil; each barrel contains about three hundred and seventy-six pounds. Last season's results:—

Humpbacks: Oil, 2254 tons 12 cwt. 21 lb.; meat, 1696 tons 9 cwt. 22 lb.; bone, 262 tons 8 cwt. 25 lb.; "finners," 47,699 lb.

Blue Whales: "Finners," 1174 lb.

Two Right Whales: "Finners," 1470 lb.

NOMENCLATURE.

I have found it a very interesting study to look up the meaning of the terms used in the naming of the Whales.

The order Cetacea, from the Greek κῆτος, any "sea monster" or "huge fish."

Suborder Mystacoceti, from μύσταξ, "the upper lip" or "moustache." This is significant, if my deductions are correct, and whoever was primarily responsible for the name had probably come to the same conclusion as myself regarding this part of the Whale. The Mystacoceti signifies simply the Moustached Whales or sea-monsters.

Suborder Odontoceti; the meaning, of course, is simple and well known—ὀδούς or ὀδών, ὀδόντος, "a tooth." The toothed sea-monsters.

Family *Physiteridæ*, from φῦσα, "a pair of bellows," or φυσάω, "to blow or spurt out"; and τέρας, τέρεα, a "prodigy" or "monster." A prodigy of a sea-monster that spurts out (water?).

Family *Balænidæ*, from the Latin word "balæna," signifying simply a Whale. This becomes a trifle mystifying when we speak of a family of the Cetacea as *the* "Whales," when the whole order is so understood.

[An eye, a large piece of skin, a large shred of epidermis, and a "finner" are being sent to the Natural History Museum, South Kensington.]

THE DIURNAL MIGRATIONS OF CERTAIN BIRDS OBSERVED AT THE TUSKAR ROCK.

By Professor C. J. Patten, M.A., M.D., Sc.D.

(Concluded from p. 195.)

Direction of Flight.

Coming now to consider the direction of flight, I have already incidentally mentioned that it differed from that observed by Mr. Eagle Clarke at the Eddystone Lighthouse during the autumn migration of 1901. Here again I do not propose going into details, as I shall have occasion in separate papers to refer to the movements of individual species of diurnal migrants. Suffice it to say that, in September and during the first week in October, 1911, the direction of flight of Pipits, Wagtails, and Swallows seen at Tuskar Light-Station was, with very few exceptions, landwards, and lay between west and north. Indeed, north-west was the most usual course. In regard to Swallows, these observations are in accordance with those made during the same autumn by Mr. Delap at Rosslare Harbour, six and a half miles north-west of Tuskar Light-Station.* Mr. Witherby, on the other hand, found that the direction of flight of Swallows was in this locality mainly southward. In his case observations were made chiefly a few miles north, but also on a few occasions south, of Rosslare Harbour. Swallows were, however, observed by Mr. Witherby going north on September 13th, 14th, 17th, and until 10 a.m. on the 18th; after that hour and until 3 p.m. they passed southward. From September 18th to October 13th the flight in the case of all observations recorded was southward. On September 11th the same ornithologist also observed Swallows flying southward.

Last autumn the direction of flight, not only of Swallows, but also of Pipits and Wagtails, at the Tuskar Light-Station differed in that during the latter end of September (1912) it was east to south-east, *i. e.* seawards. Whether we are to correlate this alteration in the direction of flight with an alteration in the direction of the wind is, with the present insufficient data to go upon, difficult to say. However, it is well to mention that, previous to September 19th (1912), the prevalent winds came from points between north and west, and the direction of flight of Swallows, Pipits, and Wagtails from the first date that I recorded their diurnal migrations up to September 19th was mainly north-west.

---

* Mr. Delap, moreover, made similar observations during many previous years. *Vide* 'Irish Naturalist,' vol. xxi., April, 1912, pp. 65–71.

On the other hand, the direction of the wind from September 19th to the end of the month was between east and south-east, and generally it blew fairly strong. Hence it may be that when the wind settles down to blow from a certain point, veering but little for many days, the migrants may elect to fly against it, *i. e.* to head the wind as they proceed on the way. This view is strengthened by the fact that Pipits and Wagtails also reversed their course *pari passu* with Swallows. It would take us rather far afield in this paper to deal with the question as to whether the landwardly-directed flight of Pipits and Wagtails signified, in the strict sense of its meaning, an immigration to Ireland. This point I shall pass over until I write on these birds separately on some future occasion.

But a few remarks may here be dealt with conveniently on the interpretation of the direction of flight in Swallows, birds whose movements in autumn, no matter what be their direction, signify a token of their departure from our shores. Neglecting the question of the direction of the wind, which should (unless the force was of very considerable magnitude) exercise little or no influence on the course pursued by this species, possessed as it is of remarkable wing-power, quick glancing flight, and marvellous adroitness in twisting and turning in the air, it is quite possible and not improbable that the land-going birds which I observed at the Tuskar Light-Station, emigrated from, or at all events passed along, the coast of Wales from some points along the shores of the extensive region of Cardigan Bay. Owing to the strongly directed south-west curve of the coast of this bay extending down to Pembrokeshire, which curve tends to lessen considerably the mileage of water between that part of

Wales and the facing part of Ireland (*i. e.* where the Tuskar Rock and adjacent coast of Co. Wexford are situated), it is quite likely that these Swallows when making out to sea in the initial phase of emigration, *en route* for the main track leading to their southern destination, overshot the mark, as it were, *i. e.* drifted westward out of their course, and then, owing to their powerful speed of flight and great keenness of eyesight, only very few minutes elapsed before they espied the outline of the Irish coast, to which they steered. Not that they had any ultimate object in immigrating to Ireland, but that they were attracted to steer landwards simply to pick up a landmark *en route* as they pursued their lengthened peregrinations. Practically all the birds I observed passing the Tuskar Light-Station were immature. Hence their passage across the comparatively narrow part of St. George's Channel may simply represent a matter of feeling their way. That immature birds are more prone than adults to leave the track which takes them by the most direct route to their ultimate destination is in part explained by the greater number of the former appearing during migration at unexpected sites.

Owing to the remarkable degree of development of the sense of vision in birds, especially their keen perception for form of objects,* a sense developed altogether out of proportion to all the others, it seems that one aid which birds receive in seeking out their destination is the faculty they possess of picking up, and recognizing the form of, certain landmarks, such as mountain-ranges, great riversheds, coastlands, or portions of coastlands with pronounced features, and, for aught we know, great cities spread out beneath may serve as guides to the aërial travellers. Young birds, unless they meet with adults, which no doubt they do at all events for part of their journey, would, in the initial phases of their migrations, have to find out their landmarks, and no doubt several of these would be out of the track and might afterwards be discarded. To say simply that birds work out their migration-routes by instinct is in a large measure merely begging the question, and certainly this conception of the matter lends no new aid to the personal observer working out the problems of flight-lines in birds. But if we take into consideration the wonderful speed, and, what is more important, the wonderful endurance of flight in birds, then a lack of knowledge among immature birds in regard to the shortest route to their destination, manifestly matters but little. To my mind the passage of Swallows across St. George's Channel and thence north along part of the Irish coast (or, indeed, for that matter, round the whole of the Irish coast), *en route* for the African Continent, as compared with the shortest possible course, is a matter of very small moment.

---

* Illustrative of this visual sense, I may point out that a tame Kestrel which I had for eight years failed to recognize me, and seemed scared if I wore a hat different to that which she was accustomed to see.

Viewing the question of the migration-route of Swallows in a technical rather than a general light, I think it worth while laying emphasis on the fact that the initial period of emigration as observed in 1901, at the Eddystone Lighthouse by Mr. Eagle Clarke, *viz.* September 24th, corresponded very closely with the date when I first saw Swallows in September, 1912, *flying south to south-east past Tuskar Rock,* i.e. *from the shore.* Furthermore, the birds pursuing a southward course, as observed by Mr. Witherby in September, 1911, appeared to do so at a later date than those which he noticed flying northwards, if we except one date, *viz.* September 11th ; and, as just mentioned, I observed the same feature in September, 1912. Moreover, the time in September when Mr. Witherby and I noticed Swallows altering their course from north to south, though observed in different years, is fairly synchronous. The south-bound birds observed by Mr. Witherby in September and early October, 1911, evidently did not pass the Tuskar Light-Station, for all the birds seen by the light-keepers and myself at that time directed their flight in the main to the north-west, sometimes, however, going due north or west. And it seems that these birds headed in the same direction past where Mr. Witherby was residing (Rosslare strand), for they were seen by Mr. Delap pursuing this route all along from Rosslare Harbour to Wexford. The ground on which these two observers worked overlapped considerably, which at first makes it difficult to reconcile their opposing observations, but when we bear in mind the significant fact that on many occasions when Mr. Delap saw birds flying north Mr. Witherby made no observations, and *vice versa* when Mr. Witherby saw

Swallows flying south Mr. Delap saw none, it looks as though the birds flying in opposite directions were in a large measure independent of each other. That is to say, the north-bound birds did not turn at once close by, and represent the south-bound birds. Rather, two phases of migration were probably going on at the same time, *i. e.* an emigratory phase of south-bound birds, and a pseudo-immigratory phase (not strictly immigratory, as pointed out) of north-bound birds. And, as already shown, only one of these migratory phases was witnessed at the Tuskar Light-Station in September–October, 1911, *viz.* the pseudo-immigratory phase. The last point strengthens the hypothesis that two independent movements were taking place, which in point of time were seen to overlap. The apparent immigratory flight of Swallows in autumn, witnessed from a rock-island six miles off the mainland, was a remarkably interesting sight. In order to obtain further data to help us to explain its meaning, I should like here to be permitted to make an appeal to ornithologists who are afforded opportunities of investigating this matter at other points of the Irish coast to make public their own personal observations.

So much, then, for the essential features of diurnal movements of Wagtails, Pipits, and Swallows, which, while also migrating at night (having been taken at the lantern according to evidence obtained from other light stations), I did not observe strike or even come in contact with the lantern at the Tuskar Light-Station. However, I *have* seen Swallows in the rays of the Tuskar lantern, and have seen both this species and Sand-Martins approaching very closely to the glass in thick weather. But heretofore I have not seen Pipits (at all events sufficiently near to identify them as such) within the zone of the lantern's rays, and only on very few occasions did I see birds which I suspected might be Ray's Wagtails, but on no occasion the larger Wagtails. Therefore, when one meets with Pipits or Wagtails in the daytime on the Rock, and does not happen to have seen them alight, the evidence is cogent that these birds reached the Rock directly, that is to say, they had not been flying round and round the lantern during the previous hours of darkness. Furthermore, their lively and restless demeanour, as they run hither and thither in search of food, does not give one the idea that they had fatigued themselves by performing lengthened and disordered movements in the dazzle of the rays during the night. In short, then, the three species under consideration perform their migrations in the vicinity of the Tuskar Light Station almost entirely by day, and the Rock, not the lighthouse balcony, is the observatory whence we behold their movements.

NOCTURNAL MIGRANTS OBSERVED ON THE ROCK AT DAWN.

In the opening pages of this paper I stated that, while my primary intention was to study the migratory movements of the three above-mentioned species, I also proposed, in regard to several other species, to touch upon some aspects of diurnal migration into which I had gained an insight during my hours of watch on the Rock. Here, however, I have practically no occasion to deal with *Direction* or other characters of flight, as before detailed, because the birds which I now wish to consider seldom flew across the Rock. On the contrary, they almost always flew straight in and alighted, and remained for a variable time, until they left either of their own accord, or because they were scared by human presence or aught else. But as the majority of these species also figured prominently at the lantern, it seems most incumbent to consider very carefully the circumstances under which they appeared on the Rock, when endeavouring to discriminate between genuine diurnal migrants and such nocturnal migrants as may have descended at dawn from the lantern, round which they had been flying during the previous hours of darkness.

Birds descended from the lantern to the Rock by: (*a*) being killed outright, (*b*) becoming stunned by striking the lantern head on, or stupefied from being hurdled against the lantern by the wind. Such birds might sustain further injuries as they drop unconscious to the Rock, as fracture of a limb, usually a wing; (*c*) breaking or dislocating their shoulder by coming in contact with some projecting object, as the pillar of the balcony-rails, the hand-rings of the window-panes, &c.; (*d*) becoming exhausted or even fatigued from flying round and round the lantern all night in a wildly excited fashion as the brilliancy of the beams of light produced a derangement of vision, at all events, temporarily or physiologically.

It is not an easy matter to distinguish between a stunned bird which had recovered consciousness and a fatigued bird. When seen at break of day both appear listless, very tame, and move about with their feathers puffed out. A bird with a broken wing at once attracts attention as it tumbles and flutters over the inequalities of the rugged rock-surface. When pursued it generally disappears by crouching in a crevice, where it will remain until dislodged by a stick or even the hand. When a post-mortem examination is made on the body of the stunned bird there is, as a rule, some cerebral or cranial lesion;* in fatigued birds there is usually no indication of damage of the head due to contact with the glass. Objective evidence such as this, even though not obtained till after death, is valuable. In regard to the occurrence on the Rock at dawn of tame and listless migrants, the evidence that they descended to the Rock at the close of a nocturnal migration becomes all the more convincing if the same species were seen at the lantern or in the rays prior to daybreak. This is a particularly important point to note in the case of birds which very seldom alight on the Rock in daylight unless associated with a nocturnal passage. I may mention three common species—the Song-Thrush, Goldcrest, Corn-Crake—which figured prominently at the lantern, and whose occasional appearance on the Rock at dawn invariably followed their advent at the lantern.

Few birds that had been hurdled against the lantern-glass by the wind were observed alive on the Rock; most of them fluttered or were carried into the sea. On September 19th, 1912, however, I examined a Song-Thrush which Mr. Power captured alive on the Rock at 7.30 a.m. The wind during the previous night blew with the force of a fresh breeze. This bird had lost a considerable number of feathers from the lower region of the abdomen and right flank. Elsewhere the plumage was good, nor was there any sign of moult. It may be well to state that, as many birds are found migrating during an active moult, it is necessary, when a specimen is captured on the Rock in daytime, to arrange carefully any feathers which may have been ruffled, and at the same time to note whether many feathers are missing, making a very careful discrimination between loss of feathers due to moult, and loss of feathers from a circumscribed spot due to the bird striking incidentally against the glass.* I have collected *dead* specimens, of various species, in which the loss of feathers bore evidence that the birds met their fate by being blown forcibly against the lantern.

---

* Birds which strike very hard often show in addition lesions of the orbit, eyeball, and spinal cord.

So much, then, for the behaviour of nocturnal migrants which descended from the lantern at dawn and tarried on the Rock, and so much for the methods adopted in seeking to obtain objective evidence in regard to the circumstances under which such migrants appeared on the Rock.

DIURNAL MIGRATIONS OF CHAFFINCHES, GREENFINCHES, AND GREY LINNETS.

Concerning birds which may have arrived directly on the Rock in daylight irrespective of the presence of the Lighthouse, it is best to examine the question from the following points of view: (*a*) the demeanour of the bird itself; (*b*) the time of day when the bird was seen; (*c*) the condition of the weather not only on the day of the bird's arrival, but also during the preceding and succeeding nights; (*d*) the presence of the bird on the Rock associated with the presence or absence of migrants of its own species at the lantern during the immediate preceding or succeeding hours of darkness; (*e*) the evidence obtained from an examination of the dead body. It will be seen that in some cases there is very little difficulty in settling the question at issue; in other cases it is well not to be too positive. Of species which obviously migrate by day as well as by night, I first refer to the Chaffinch. This was a bird which I observed and obtained far more frequently by day than by night; I did not see one tame or listless bird—all were bright, lively, and rather wild. Chaffinches arrived at various hours in the day, and owing to the fact that on alighting they invariably uttered their shrill alarm-note, which I could usually hear when in my room, it was not difficult to set down the hour of their arrival. I seldom saw this bird at first dawn as one would have expected, had it been at the lantern the night before. In support of the view that

---

* *Vide* article on "The Dartford Warbler in Ireland," 'Irish Times,' Dec. 26th, 1912, pp. 5 and 6.

Chaffinches travel largely by daylight, I may say that I actually saw several descend and alight on the Rock. The prevailing weather had little effect: in markedly rough weather, however, they often were absent; they appeared on the Rock at times when no Chaffinches were seen for days before and after near the lantern. Post-mortem examination showed that in the case of vigorous birds collected in broad daylight (mostly three or four hours after dawn), the bodies were well-nourished, and the gizzards contained some foodstuffs. The same was found to be the case in specimens which were collected when striking the lantern, and in specimens found in a dying state in the early morning following a migration night. The latter no doubt had injured themselves at the lantern; indeed, objective as well as circumstantial evidence showed such to be the case. But I have also obtained a few dead specimens on the Rock in very poor condition. These were evidently birds which remained on the Rock from stress of weather. Being largely granivorous in their diet, they soon succumbed, as the form of food obtainable on the Rock, *i. e.* insects, minute crustaceans, and molluscs, was little partaken of, either because it was not readily discovered, or was too foreign to the bird's taste. Further particulars, especially in regard to the question of immigration and emigration, will be given subsequently on the migration of this bird separately. The features of migrations of Greenfinches and Grey Linnets, migrations largely effected in daylight, are markedly similar to those of Chaffinches. But I saw considerably less of the former two species, and made no records of these birds striking the lantern. However, a tame and listless Grey Linnet was captured by Mr. Glanville on the Rock on the morning of April 22nd, 1912, and the occurrence of this bird cannot be dissociated from the occurrence of great numbers of several species—probably including Grey Linnets—at the lantern during the previous hours of darkness. In passing, I may mention that I have seen in broad daylight also a Yellow Bunting and a Snow-Bunting (each on a separate occasion) suddenly, as they were passing at a considerable height, swoop down and alight on the Rock. I thus was enabled to ensure their identification. It was self-evident that the birds were effecting a diurnal migration. Other species, whose diurnal migrations are on the whole fairly obvious, may be dealt with more expediently on separate occasions.

DIURNAL MIGRATIONS OF WHEATEARS, WILLOW-WARBLERS, CHIFFCHAFFS, AND SPOTTED FLYCATCHERS.

It may be well, however, to consider now the diurnal movements of a few well-known species, movements not so easily detected. I shall confine my remarks to four species: Wheatears, Willow-Warblers, Chiffchaffs, and Spotted Flycatchers. The diurnal movements of others, mainly of less frequent occurrence, will, I hope, be considered subsequently. No bird figured more prominently on the Tuskar Rock, as well as at the lantern, than the Wheatear. This was especially so in the fall of the year. And while more of these birds assembled together on a given occasion round the lantern—naturally owing to the lure with which they were presented—nevertheless the percentage of observations made and specimens picked up on the Rock in daylight was very considerable. I shall, however, avoid now setting forth actual statistics; such will receive their proper place when dealing exclusively with the migration of the Wheatear.

Unlike the preceding species just dealt with, neither the Wheatear nor the three following birds now under consideration appeared to adopt the custom when passing of descending abruptly from a considerable height to alight on the Rock. That they may migrate for a considerable distance at a fair height above the surface of the sea is a question which I am not prepared to consider in this paper. It would appear, however, that, on sighting the Rock and wishing to alight, they descend rather obliquely, and fly in over the waves until they reach their perch. On a few occasions I have actually witnessed the arrival of Wheatears, Willow-Warblers, and Chiffchaffs (not, however, Spotted Flycatchers) along the outlying reefs. But owing to the small size of these birds and the difficulty of "picking them up" as they flew along over the ever-moving surface of the sea, I was unable to say at what distance off they made the descent. In by far the greater number of instances these birds had already arrived unknown to me. Owing, however, to their extreme restlessness as they repeatedly flew from one end of the Rock to the other, they hardly could, for any length of time after their arrival, have escaped my notice as I patrolled the Rock. Handicapped, then, by a lack of positive knowledge in regard to their advent on the Rock, it becomes necessary to apply more rigidly still the tests which were applied in the case of the Chaffinch and other birds whose migrations by day appeared more obvious. In demeanour all four species showed great activity. Wheatears naturally appeared more at home on the Rock than did the Warblers and Flycatchers. The contrast in the behaviour of these particular Willow-Warblers and Chiffchaffs appearing at various hours in the day and of those observed at dawn, thoroughly tired out after flying round the lantern for many hours before daylight broke, was very noticeable. Flycatchers were decidedly active, but I could not contrast their individual demeanour, as I did not see a single listless or even tame bird. But I picked up a few dead specimens on the Rock, which, as post-mortem examination revealed, had struck the lantern the previous night. However, owing to the very different hours at which Flycatchers appeared on the Rock, I have little doubt that they were not laggards which originally had descended from the lantern at dawn. In all four species I obtained evidence that their advent on the Rock was not necessarily associated with the presence of birds round the lantern on corresponding nights. Nor did post-mortem examination reveal any evidence that the specimens collected had in any way collided with the lantern. They were all in good condition. It is well to mention that, owing to the similarity of the Tuskar Rock to their *natural habitat,* Wheatears frequently remained on for several days, apart from being held up in rough weather. These genuine laggards were mostly immature birds. Lack of fresh water and much limitation in the amount and choice of diet soon told on these birds, which daily grew less active. In four to six days they became so listless as to be almost indistinguishable in their demeanour from fatigued birds observed at dawn which had descended from the lantern. By counting the number of these laggards daily, and noting their dissociation with any nocturnal migrants, I was able to keep the study of the two phases of migration apart. Except Flycatchers, of which only solitary examples were observed at a time, each of the other three species appeared for the most part in small parties. The whole four species were not recorded as occurring on the same day, one or two being more usual. In any case, individuals of the same kind showed a marked tendency to keep together, as we have seen, not only in the case of other diurnal but also of nocturnal migrants, when the latter are effecting natural night-flights in clear weather.

DIURNAL MIGRATION OF THE TURTLE-DOVE.

Before leaving the subject, I may refer to a Turtle-Dove which I observed on the Rock just about sunrise on Aug. 26th, 1912. The bird stood quite still, and in the bad light and heavy rain I was not sure as to what species it belonged. On securing it, and finding it to be a Turtle-Dove, I *at once* examined the crop and gizzard, both of which contained wheat. Now, as the crop was well packed, and most of the grains of corn had not undergone any softening, the presumptive evidence is strong that this bird fed at dawn probably not far from where I captured it. In other words, it probably emigrated from the South of Ireland. At all events, it could hardly have been winging its way during the hours of preceding darkness, having made its last feed the evening before. Here, then, is a case of a bird which, though I did not make direct observation of its actual arrival by daylight on the Rock, or of its demeanour, and so on, yet analysis made on the contents of its crop point to the fact that it appeared on the Rock as a diurnal migrant, and owing to the heavy rain prevailing at the time, or perhaps scared by the sight of a hawk, this Dove was tempted to alight and seek refuge.

CONCLUSION.

In conclusion, I wish to draw special attention to a supremely important fact, namely, that a comprehensive study of bird-migration, as it occurs in daylight, might be made at the Tuskar Rock, *apart from its being a light-station at all.* By day the presence of the Lighthouse is a non-entity to passing birds; by night, under certain meteorological conditions, it is verily a huge decoy. Were it possible to secure adequate shelter in all weathers on any marine rock island lying in the migration route, I venture to say that the ornithologist who elected to take up his abode at such a site could see much of what I have already put forward in this paper. But such shelter is not obtainable—at all events on rugged wave-swept rocks—in other than in the dwelling apartments of lighthouses. Indeed, were it not for the most kind sanction of the Commissioners of Irish Lights whereby I have been enabled to become housed securely against the ravages of wave and storm, I never could have culled the knowledge which I now have put forward in this paper on a special phase of bird migration. Were one to study only the phenomena of birds assembling and making contact with the lantern at night, then a vast amount of most instructive information would never come to hand. I would also lay emphasis on the fact that the topographical aspect of the Rock itself demands the closest study. Thus its relative height above the sea-level may have a more or less direct influence in inducing passing migrants to break their journey and alight; while the question as to what water and food can be obtained would exercise a varying influence on the length of stay which a bird might make; these and several other points, which can only be studied when residing on the Rock, affect the whole question of the features of diurnal migration in a marked degree. Such important facts, however, could hardly be expected to enter the minds of ornithologists who, while writing on the subject of bird-migration at light-stations, had not thoroughly familiarised themselves with the special topography of each station. This fact is brought home very clearly in Mr. Moffat's note entitled "The Tree-Pipit as an Irish Bird."* Here, in entering a caveat against my suggestion that the two Tree-Pipits which I recently obtained at the Tuskar Rock might be Irish emigrants, he draws analogies between the occurrences of several species *rare to Ireland obtained on autumnal migration only* (as recorded by Mr. Barrington)† and the occurrence of the two Tree-Pipits above mentioned which I obtained. He considers all as autumnal stragglers, and all killed at light-stations, as though always attracted by the light, adding that the tendency to come to the lights in autumn and not in spring is extremely significant. Such analogies can hardly be established in the absence of a full and personal knowledge in regard to the exact circumstances under which the birds were obtained ; even endowed with this knowledge, it might be still a difficult matter to decide as to whether analogy existed in every case. My Tree-Pipits, though obtained on a rock on which a lighthouse happens to be erected, did not in all likelihood approach the lantern, but arrived in full daylight, when no luminous beams were shining to allure them. I have already given strong evidence in favour of adopting this view in the body of this paper. Here I may strengthen the evidence still further by stating that on the day when the first Tree-Pipit was collected, there were exceedingly few birds seen in the vicinity of the lantern during the previous hours of darkness, and when the second Pipit was collected no birds at all appeared at the lantern the night preceding, the weather being altogether unsuitable for alluring migrants. Hence for this and other reasons already mentioned, these Tree-Pipits could hardly have descended from the lantern at dawn and, as fatigued birds, remained on the Rock for several hours until I collected them. Besides, we must keep clearly before us the important fact that visits of Pipits of any species to the Tuskar lantern are very exceptional, whereas Meadow-Pipits in great numbers, and Rock-Pipits in lesser numbers, not only pass by but also frequently alight on the Tuskar Rock during their diurnal movements. I believe that the Tree-Pipits here under consideration were, after venturing to set out in the early hours of the morning, held up almost at once by the high winds which prevailed on each occasion, and so they took advantage of alighting on the Tuskar Rock which lay in their route. The tendency for *Pipits as a class* to alight in greater numbers proportionately in rough weather has been already pointed out.

---

* *Vide* 'Irish Naturalist,' vol. xxi. December, 1912, pp. 246–247.

† *Vide* 'Migrations of Birds at Irish Light Stations,' pp. 11, 72, 181.

Incidentally referring to the Reed-Warblers which I collected, Mr. Moffat considers these birds, together with two of the same species previously recorded by Mr. Barrington, and several other species besides, as *autumnal stragglers*. Of the circumstances in connection with the capture of Mr. Barrington's specimens I have few details ; we are told that they were killed at light-stations in autumn, and of the total numbers of each species mentioned that never more than a solitary example was obtained on the same date from the same light-station; indeed, for the most part it seems that the birds of the same kind were obtained in different years at different localities. I note particularly that such was the case in regard to the capture of Mr. Barrington's Reed-Warblers. The occurrence in regard to my specimen, however, does not present analogous features, for, in the first place, two specimens were secured at the same time and at the same site; and this is not all, for I observed three more. Hence, technically, Mr. Moffat is mistaken when he states that my two specimens, added to those two obtained for Mr. Barrington, make four autumnal *occurrences*. He might either say that the bird has occurred three times, twice as solitary individuals, each on different dates and each at different localities, the third time five examples being seen together at the same locality and synchronously, two of which were collected; or he might say that, in addition to Mr. Barrington's two separate occurrences, five birds, two of which were collected, were seen together at the same time and at the same place, making *seven* occurrences. Bearing in mind that I saw the party of Reed-Warblers at 10.30 a.m., and had only come out on the Rock to look for birds an hour or so before, it is quite likely that still more individuals of this species were present earlier, and had passed on. At all events, the evidence afforded by the presence of five birds—perhaps parents and young—does not necessarily point to the species being a straggler. Furthermore, I am not at all sure that I did not see a few Reed-Warblers again this year on the same Rock. About this matter, however, I hope to have more to say another time.

It is perhaps straining a point to state that the capture of Mr. Barrington's specimens and mine ran parallel, for in the case of the former the birds were killed *striking the lantern at night*, and in the latter case they were *collected on the Rock in broad daylight*. Now, as I saw no birds of any kind in the rays of the lantern during the hours of darkness which preceded the capture of my specimens, and as the whole five Reed-Warblers showed no signs of having been to the lantern, it seems quite likely that they were coursing along by daylight at no great distance from the land of their departure when they encountered the Tuskar Rock. There, owing to inclement weather (a rough wind and steady downpour of rain prevailing at the time), they broke their journey, and so afforded me the chance of observing them. A highly important piece of evidence, showing that they were not fatigued, and were moreover shy, is the way in which the three, which I did not collect, immediately they missed their companions hurriedly left the Rock, *even in heavy rain*, and speeded along over the waves. Were they fatigued, not only my presence but even the terrible rending noise produced by the fog-explosive then in action would not have driven them off the Rock, unless they differed markedly in their habits from many other species of Warblers which I have a score of times seen stand such menace.

Of course, one cannot say definitely where these Reed-Warblers came from before reaching the Rock: I cannot, however, believe from their demeanour when living, and from their bodily condition as examined after death, that they, in a protracted journey, had been carried out of their course by the wind. At the time and indeed for many hours before their appearance the wind, blowing with the force of a moderate breeze, came from the *south-west*, and so could hardly carry the birds across from the shores of Great Britain. After all, these birds may have emigrated from Ireland, for, until the vast watersheds and abundant reed-grown ponds, rivers, and lakes have been systematically searched by ardent and patient field ornithologists, it is wholly unjustifiable to conclude that Reed-Warblers absent themselves from Ireland during the breeding season. Many of the great luxuriously grown reed-beds, such as those of the River Shannon, offer a special inducement to Reed-Warblers for breeding purposes, and it would well repay ornithologists resident in Ireland to investigate this matter personally. I cannot but believe that Ireland catches the western fringe of the migratory routes of more birds than we think. In comparatively recent years a substantial addition has been added to the list of birds, which for the most part breeding in greater numbers in the sister Isle also breed in Ireland. We have also considerably increased our knowledge in regard to the wider distribution of several species which, not remaining to breed, pass through the country on migration. At all events, much more *personal field* *work* must be carried out before we can afford to relegate several species which have only occurred on autumnal migration within a few miles of the mainland of Ireland to the position of stragglers; at the same time, full details must be collected of the site and circumstances under which every specimen has been recorded. Nor can we neglect to study carefully the individual distribution in Great Britain and elsewhere of such migratory species. It seems to me a somewhat *a priori* argument, without sufficient evidence, to advance that species occurring as regular summer visitants to England, but only as autumnal visitors on migration to Ireland (and this only as far as we have ascertained by evidence afforded in the capture of birds at lighthouses), are mere stragglers, no matter what may be their difference in range of distribution and in numbers in the quarters where they breed.

NOTES AND QUERIES.

AVES.

Nuptial Display of the Pied Wagtail and Yellowhammer.—With respect to the nuptial display of the Pied Wagtail (*ante*, p. 196), I have the following record, which adds one or two points to the description by Mr. G. T. Rope:—"The cock kept moving about a yard off the hen, in front of her, bowing his head repeatedly; then approaching, he spread his tail, deflecting it, and displaying to the full the striking contrast between the deep black and the white. With his wings spread, his body pressed upon the ground, inclined to one side, and all tense, he dragged himself slowly towards the hen." The act of coition followed. Mr. E. Selous has summarised, in the 'British Bird Book'—in which the above note also appears—observations on the display of the Yellowhammer by Ussher and Warren and by Boraston:—"As for the male Yellowhammer, he, too, will raise the feathers of his crest or rather scalp, and, with wings drooped upon the ground, parade about the female. . . . The white border feathers of the tail . . . are by the sudden spreading out of the latter . . . frequently flashed into view." The holding up of the wings, mentioned by Mr. Rope, is a new addition.—F. B. Kirkman (Letchworth, Herts).

Nuptial Display of the Pied Wagtail.—Some years ago I had the good luck to observe this habit in the Pied Wagtail, but I am unable to lay my hand on my notes. However, my observations agreed with those of Mr. G. T. Rope (*ante*, p. 196), but in addition the cock bird spread out his wings and his tail much after the depicted manner of the Argus Pheasant, and the striking black and white plumage of the wings, tail, and back appeared to merge in one regular pattern with the head in the centre. It was certainly a wonderful and beautiful sight.—John R. B. Masefield (Rosehill, Cheadle, Staffs.).

The Sense of Beauty in Birds.—Mr. G. T. Rope's remarks on the nuptial displays of the Yellowhammer and Pied Wagtail (*ante*, p. 196) caused me to turn up a few notes of mine on the Yellow Wagtail. The behaviour of this species provides a little puzzle for those who hold the view that birds respond to the same æsthetic impulses as those influencing *Homo sapiens*. To my mind the male Yellow Wagtail is a remarkably beautiful bird, both from the purity of its colour and because of the unusual grace of its outlines; in the Grey Wagtail, it will be remembered, although the yellow is more delicate —shall we say primrose as compared with the daffodil of *M. raii*?— the disproportionately long tail quite destroys the balance of the design of form.

When parading before the female, either on the ground or hovering just above her head, the male Yellow Wagtail puffs out his plumage until the feathers are on end and the colour lost, and the beautiful outlines entirely vanished. Now, if we agree that to human eyes the Yellow Wagtail is beautiful, we are bound to admit that when he wishes to attract the attention of the female he makes himself *un*-beautiful. The bird in an ordinary frame of mind is totally different in outward appearance to the same individual when under the influence of sex. We cannot have two standards of beauty here: one must be handsomer than the other; and I can explain my preference by describing the fine yellow of the sleek-plumaged bird and the harmonious design of its outlines. Under the empire of love he makes himself ugly, according to my standard. The way out is simple—we can refuse to accept these popular views on animal æsthetics until at least one example has been definitely proved.

The case of the Bullfinch can be described here, for I think it must be new to ornithological literature. The song of the male, I might explain for those who have not heard it, is a peculiar spluttering whisper that is inaudible at more than a very few feet; indeed, only by the rarest of chances do we hear the full song in the fields, so low are some of its details. The males collect in small parties in early spring, and sing in concert.

Many birds (Sandpiper, Golden Plover, &c.) string their call-notes together in the form of a loud warbling song, but most birds appear to keep the two voices separate. In the Thrush, for example, the song is far louder than the call, and this is a useful fact for those who see a challenge or a signal in bird song. In the Bullfinch, as I have found by many experiments, the call-note is at the very least four times as loud as the song. If the bird desires to call the females, or to drown the voices of its rivals, why does it not use a repetition of its ringing "hoop"? So far as we can see, the uttering of the call-note needs little physical effort; yet the *singing* bird is trembling with what certainly appears to be suppressed muscular effort. Dr. Stolzman and Dr. A. R. Wallace long ago held song to be nothing but the ebullition of superfluous energy, and I continue to feel that this should be carried still further, and believe that song, and such phenomena as ornamental plumes (*not* bright colours) and vernal flights or dances, have no connection other than an indirect one with sexual affairs. At least, this theory fits in with my own observations, which is far more than I can say for the old theories that song is primarily a phenomenon of sex.—Fredk. J. Stubbs.

Syrnium aluco in Suffolk.—The Tawny Owls returned to our church-tower this year for the seventh year in succession. Their game-bag, however, was not so varied as that of last year (*cf.* Zool. 1912, p. 228), as I found no rats or moles in the nest—in fact, nothing beyond a few small rabbits, some field-mice, and many feathers of small birds. Three eggs were laid, one of which by some means got broken in the nest, and, from the different size of the two owlets, they were probably hatched from the first and third eggs laid. Most troublesome and adventurous owlets they were, for one Sunday morning there was much excitement in the churchyard just before service, as both had fluttered down from the nest, and were found under the tower. One boy suggested he should go for a cage, but a worthy woman took them in charge, declaring that no one should touch the Owls, and I put them back, making the exit rather less easy. A little later they got out again, and the larger bird could not be found; the smaller one was on the ground under the tower, drenched to the skin by heavy rain, and looking a most pitiful little object. The parents had evidently not neglected it, for close by were the remains of a young thrush and a dead toad, the latter not touched. I put it back again, and visited the nest next day, quite expecting to find it dead, but it was dry, clean, and perfectly well. It remained for about a fortnight, and disappeared once more—this time, like the historic dove of the Ark, it was not seen again. Certainly the erratic behaviour of this pair of youngsters fully justified a remark lately made to me: "It seems a wonder that any Owls get off at all," for when they get out of the nest young Tawny Owls are completely at the mercy of anyone who finds them.—Julian G. Tuck (Tostock Rectory, Bury St. Edmunds).

Greenland Falcon (Falco candicans) in Co. Mayo.—I have just heard from my friend Captain Kirkwood, of Bartragh House, that on Sunday, May 4th, as he was sitting in a sheltered nook of the sand-hills, a lovely Greenland Falcon passed within ten yards over his head, and fled on to the marsh where the Lapwings nest, among which he caused great commotion, but, not having succeeded in securing a bird, he returned and fled to the lower end of the island, probably in search of young rabbits. He says this bird was much whiter than the one shot by Miss Kirkwood on the island on March 2nd.* Bartragh Island is a safe refuge for rare birds; a narrow range of sandhills, with about thirty or forty acres of good loamy soil on the eastern end, upon which the house and offices are built, and, as no poachers are allowed to visit the island, it is a perfectly safe refuge for any birds coming from the north. — ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

Rufous Variety of the Partridge (Perdix montana).—Mr. G. H. Gurney, in his interesting "Ornithological Report for Norfolk, 1912," says: "One thing which is curious about this erythrism is that more than two or three are *never* found in one covey" (*ante*, p. 181). I can supply the exception to this statement, but I much doubt if it proves the rule! In September, 1900, three birds were shot at Pyrehill, near Stone, Staffordshire, *out of a covey of five, all of this dark rufous* variety. The remaining two birds paired the next spring, but one was killed by flying against telegraph-wires. These facts I recorded at the time in a short paper which will be found in vol. xxxvi. p. 49, of the 'Transactions' of the North Staffordshire Field Club. A dozen birds at least of this red variety have been reported for this county.—JOHN R. B. MASEFIELD (Rosehill, Cheadle, Staffordshire).

Black-throated Diver (Colymbus arcticus) in Co. Mayo. — On Sunday, May 11th, a Black-throated Diver in summer plumage was seen by Captain Kirkwood in the narrow channel between Bartragh and the island of Bannros; the bird swam in towards where he was sitting, and having his glass he had a good close view, and was able to distinguish the *black* throat and *white* markings on the back. This species is very rare in Killala Bay and the estuary, and not since April 20th, 1851, when my brother observed a Black-throated Diver in summer plumage in the same channel where this bird was seen by Captain Kirkwood, has one either in winter or summer plumage (although every winter I was wildfowl shooting in the estuary) ever come under my notice; and when out in my shooting-punt I always kept a good look-out for any strangers; indeed, it was one of the great enjoyments of wildfowl shooting—the *expectation* of some rare visitor turning up in the course of the day.—ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

---

* *Cf. ante*, p. 155.

AMPHIBIA.

Destruction of Toads. — I was very interested in the communication of the Rev. H. Marmaduke Langdale on the subject of Rats eating Toads, which appeared in 'The Zoologist' (*ante*, p. 159). Whilst out quietly prospecting for snakes in some swampy ground at Welsh St. Donats, Glamorganshire, I observed the rushes swaying about, indicating a disturbance at their base. On remaining quiet for a few moments I saw a fawn-coloured Rat (*Mus decumanus*), about one-third grown, which appeared to be jumping about upon a lump of peaty earth. Approaching within six feet I saw the apparently inanimate peat rise and walk; it was a full-grown toad. Taking out my watch, I waited to see what was going on. The rat ran round the toad several times, and, coming up behind it on the left side, began biting into it slightly to the left of the backbone. Placing its fore paws on the toad, it reached forward to the neck, and, taking the skin in its incisors, tore it back, strip after strip, leaving these shreds hanging about the abdominal region; having cleared the ground, so to speak, of the noxious derm, the rat continued eating. Several times the toad had walked or clambered forward a few inches; the rat, with its fore paws on its living meat, hopped along with it. Six minutes had elapsed since I took out my watch, and thinking it best to end this gruesome feeding, I (now only four feet away) brought down the bamboo I was carrying, aiming at the rat; however, the latter leapt adroitly aside and fled. I dispatched the toad, which was alive and showed no concern at the hole in its back. Incidentally, during the previous part of the proceedings, a shrew—looked more like a water-shrew than the common species—was running around the chief actors and up the stems of aquatic plants, apparently agitated or interested in what was happening. This took place in the afternoon of May 13th. On Feb. 8th I put up a Magpie within a stone's throw of the same spot. This rascal was busy disembowelling a very large toad. On reaching the latter I found a hole in its side large enough to insert a thumb for an inch or slightly more; the viscera of the amphibian was lying in the sunshine by its side. The toad blinked and squatted down, seemingly indifferent or stupefied; I cannot say which. Just before spawning takes place I have found scores of female toads disembowelled lying near the water's edge. I have often observed the Carrion-Crows pecking about, though every endeavour to approach near enough to see at what they peck has been thwarted by the wily birds. The keeper states definitely, though on what grounds I know not, that the crows open up the toads to get at the spawn.

Toads are very plentiful in the Welsh St. Donats district, whilst frogs are comparatively scarce; thus the grass-snakes are often compelled to eat toads through scarcity of their favourite food. In captivity also *T. natrix* makes no trouble over eating small or half-grown toads, though if given the choice the frog is selected. The greatest destroyers of toad-life, however, are the fires which are started every spring to burn the old bracken; hundreds of charred remains of poor *Bufo* are to be found scattered about after one of these conflagrations.—Arthur Loveridge (Kilternan, Llandaff).

CRUSTACEA.

The Maximum Weight of the Edible Crab (?).—This question has been recently raised in these pages by myself (1912, p. 272), and by Mr. A. H. Patterson (*ante*, p. 77). My friend Mr. John Callenso, of Penzance, has taken considerable trouble in procuring me authentic information on this matter, and has just forwarded me a copy of 'The Cornish Evening Tidings' for May 29th last, containing a report of a meeting of the Cornwall Sea Fisheries Committee, held at Truro on the previous day. At this meeting Mr. P. P. Williams stated that one of the fishermen in his district recently caught a Crab weighing 13 lb. 3 oz.—W. L. Distant.

Immense Swarms of Euthemisto compressa on the Shore at Redcar.—On Friday morning last (May 23rd) I went on to the sands, the tide being low, and noticed that from high-tide mark to the water's edge the shore was littered with these little creatures, evidently left by the ebb; in some places the sands had the appearance of there having been a slight fall of snow, which had partly melted and formed a kind of slush. I recognized that they were all *Euthemisto compressa*, and that there was an unusually large number of them. The next day I went again on to the shore, and then found that there had been a most extraordinary influx of the crustaceans on the previous tide; the shore was practically covered with them, and at high-water mark they were in such quantities that they resembled small snowdrifts several inches in depth, and so conspicuous as to be easily noticeable at a distance of over a quarter of a mile. All the little pools on the beach and on the rocks were swarming with them, and they were generally swimming on their sides (this is the first time I have seen them swimming). Those in the drifts and on the wet places of the sands were all alive. On either side of Redcar—to Saltburn on the east and Teesmouth on the west—a similar state of the shore prevailed. I am informed that one of the fishermen raked together heaps of the crustaceans, and took them in barrow-loads to put on his garden for manure. I have seen small visitations at irregular intervals for several years past; in 1892 there were a good many, and again in 1907, but never before have they occurred in such swarms as on the present occasion. To-day, which is a week since they first appeared, I could point out greyish patches on the sands where accumulations had been formed, the remains now being merely the skins or cases. These visitations invariably occur in spring, with north or north-east winds, but last week the wind had been westerly for several days before the 23rd. I think the theory regarding these occurrences is that the ocean currents setting in from the Arctic seas southward in spring carry these little creatures to our waters, and so they are drifted in and come under observation if suitable conditions prevail. I understand that *E. compressa* is considered to be rather uncommon; it has been reported from the Norwegian coast, and from further northward, so that the present visitation is unusually interesting.—Thos. H. Nelson (Seafield, Redcar).

P.S.—Since writing the above I had some conversation with a friend, who tells me he was bathing, on May 23rd, at the east side of Redcar, and the sea was swarming with *E. compressa*. He said he could scoop up hundreds in his doubled hands, and his bathing costume was covered with them when he came ashore. Bathing was rendered quite unpleasant owing to the millions of these little creatures. I am reminded that in 1892 Canon Norman named some crustaceans for me, amongst them *E. compressa*, the first specimens known in British waters (see 'Naturalist,' 1892, pp. 144 and 175–6; also 'Birds of Yorkshire,' vol. ii. p. 692).—Thos. H. Nelson.

[Dr. W. T. Calman, who has seen some of these specimens, also refers to Norman (Ann. Mag. Nat. Hist. (7), v. p. 132 (1900), and Petch and Norman, 'Naturalist,' 1904, pp. 158–159.—Ed.]

ANNELIDA.

Dutrochet's Land Leech in Surrey.—Since the previous record of this species in Surrey (Zool. 1911, p. 155), there is now evidence that *Trocheta subviridis* is far from uncommon in this county. In April last my gardener brought me three examples which he had found in the clay subsoil near my garden. I forwarded them on to Mr. W. A. Harding, who identified them as the above species.—W. L. Distant.

ZOOLOGICAL NOTES FROM MENTONE, 1912.

On Oct. 31st I had given to me a female Blackcap, and on Nov. 5th a female Golden-crested Wren, both of which had been obtained in the Valley of the Borigo. Blackcaps have been plentiful in the gardens during the past winter, and are evidently sedentary in part, but some may migrate to higher ground in summer; they frequently uttered their call-note, which resembles the sound produced by striking two stones together. This note is sometimes repeated very often and very loudly, and then becomes, I suppose, a note of alarm or warning. I had one in my hands, with the under mandible partly and the feet wholly horn-coloured; I judged these to be marks of immaturity. There was a bare reddish ring round the eyes. On Dec. 17th I flushed a small bird on the Chemin de l'Annonciade, which appeared to be wholly black, but as it had a red tail, I have little doubt that it was a Black Redstart. Four days later I saw one of the Yellow-breasted Wagtails in the garden; I believe this was the Grey Wagtail (*Motacilla melanope*). The breast was very pale yellowish, the throat black, bounded by a narrow whitish line; the black of the throat was not quite pure. A male Golden-crested Wren, given to me on Dec. 23rd, had the crest a bright orange-red, with only a few minute yellow feathers visible. I received a Willow-Warbler on the same day, so that bird is also apparently resident all the year.

On March 8th I noted that almost all the Gulls had coal-black (not brown) heads and black bills and feet. Some had wholly white tails; the tails of others were white tipped with black. There were a few the wings of which were streaked with white and ashen. Further observation is necessary before one can pronounce an opinion on the species. Two large gulls seen with the smaller ones on Feb. 2nd were, I believe, Lesser Black-backed Gulls.

About July 7th or 8th, as I was sitting by the Bévéra, near Sospel, I became suddenly aware that a large snake was in front of me, close to the side of the stream, whither, I suppose, it had come to drink. It saw me, and appeared undecided how to act, turning its slender and graceful head anxiously from side to side. I moved slightly, and it turned sharply round and slid under cover in the twinkling of an eye. I never saw Tasmanian snakes glide so rapidly. The upper surface was conspicuously marked with black (or perhaps very dark green) and yellow. The species was *Zamenis viridiflavus*, Wagl. In June, near Sospel, and near Moulinet, I saw on several occasions a bright green Lizard, minutely dotted with black, about nine or ten inches long. It was one of the numerous varieties of *Lacerta viridis*—"supra flavo-virens, punctis atris creberrimis variegata" (Schreiber, 'Herpetologia Europæa,' p. 442). When surprised they invariably betook themselves to a hole in a bank. I once saw a small Gecko, probably *Hemidactylus verruculatus*, in the street here.

When I was in Lisbon, in April of this year (1913), I visited the aquarium at Algés, and there saw several examples of *Tropidonotus viperinus* in a glass tank, and wholly under water, with the exception of their heads. The Portuguese name on the label was *Cobra d'agua* (Water Snake). This interested me, because a friend at Mentone had told me that he had seen a snake in a pond (or stream) there wholly under water, and had jerked it out of the water with a stick. The Green Lizard which I saw in Portugal was a totally distinct variety from that which I saw in the Alpes-Maritimes. It was of a pale sage-green hue, and had irregularly shaped black spots.

I regret to say that the butterfly which I saw at Mentone on Aug. 24th last (as mentioned in 'The Zoologist' (1912, p. 430)) was not *Vanessa antiopa*, as I thought at first, but the much rarer *Charaxes jasius*. At the date of writing (Nov. 28th, 1912), a few Red Admirals may still be seen, and occasionally a Locust in a semi-torpid condition. Last winter (1911–12) a Locust maintained its position on a slender peach branch during the greater part of the winter. On Nov. 26th, 1912, I found a spider beneath a large stone on the Chemin des Castagnins. It proved to be the rare male *Cteniza moggridgei*, Cambr., the female of which constructs a trap-door nest. On the 20th of the same month I had taken a green Orthopterous insect (*Conocephaloides nitidulus*, Scop.); on the 22nd, *Cebrio gigas*, Fabr.; on the 27th I caught a Locust (*Acridium ægyptium*, L.). On Dec. 1st I saw a Mole-Cricket (*Curtilla gryllotalpa*, L.) crawling along a hard garden-path. The Mentonese call it "ortolan" (gardener), and say that it makes holes in potatoes. On the 27th of that month I saw the last butterfly of the season—a Red Admiral. The day was bright and warm, and the insect remained on the ground with fully expanded wings for some minutes, as if to absorb every ray of sunshine.

On the evening of Jan. 25th of the present year I perceived at the side of the garden path three minute and faint specks of light which proceeded from a female *Lampyris*. The creature was absolutely wingless, and bore some resemblance to a woodlouse, but did not roll into a ball, but crawled about on short legs. The upper surface was flat and projected beyond the under surface. When placed on its back it righted itself by means of a steady twist of the whole body.

This is the only female *Lampyris* I have seen here, although near Lausanne I have seen several, but probably of a different species, as their light was more conspicuous and slightly greenish. The Humming-bird Hawk-Moth was first seen on Feb. 3rd, a small white butterfly on Feb. 7th, and the Brimstone Butterfly on March 14th.—J. R. McClymont (Maison Roche, Avenue Carnot, Mentone, France).

OBITUARY.

Lord Avebury.

Lord Avebury, perhaps better remembered as the once Sir John Lubbock, passed away on May 28th last at his seaside residence, Kingsgate Castle, near Margate. He was born in London on April 30th, 1834, and after three years at Eton entered his father's bank at the age of fifteen, being at the time of his death head of the firm of Robarts, Lubbock & Co., and will be remembered as an acknowledged authority in finance, a well-known politician, an anthropologist principally from the archæological and social standpoint, and a naturalist in restricted and special groups of animal life. Lord Avebury belonged to the Victorian era, and was a man of varied taste and busy life; his business training and courteous manner, apart from his scientific knowledge, made him an excellent president, and his official positions in the scientific arena showed that these qualities were not unrecognized.

It is, however, with his zoological services that we are now interested, especially those relating to anthropology. In this field he contributed to the knowledge of the student in books that could be read with interest by a large class of general readers. His 'Prehistoric Times' (1865), and 'The Origin of Civilization and the Primitive Condition of Man' (1870), of which there was subsequently more than one edition, were excellent examples of arguments based on available information, much of which has now been supplemented, and some qualified, by subsequent investigators. Their effect in introducing anthropological conclusions to the educated public in the early days of the science of man in this country was more than considerable.

In entomology he wrote 'The Origin and Metamorphosis of Insects' (1873), 'British Wild Flowers considered in Relation to

Insects' (1875), 'Ants, Bees, and Wasps' (1882), and especially with reference to the last subject rightfully and at once obtained the verdict of being an original, patient, and reliable observer. To the ordinary reader he will be remembered as opening the discussion—now some years ago—on the "Hundred Best Books," and by the industrial toilers as the introducer of two welcome and beneficial Acts of Parliament—the Bank Holiday (1871) and the Shop Hours Acts (1886 and 1904).

NOTICES OF NEW BOOKS.

Problems of Life and Reproduction. By MARCUS HARTOG, M.A., D.Sc., &c. John Murray.

MANY readers will wish that Dr. Hartog had not been prevented from following his original aim in this publication, which, he tells us, was to produce "A general treatise on Reproduction, suited to the layman interested in biological questions, and without any technical preparation for their study." He has, however, been compelled to alter his plan, and has reissued a collection of essays previously published at different times and in various journals, but these have been in some cases remodelled, and all have been brought up to date.

Of these, the two that will probably be read with most avidity are "The Transmission of Acquired Characters," and "The Biological Writings of Samuel Butler." The first is combative to the views of Weismann and the "Neo-Darwinians," and is in a sense frankly "Neo-Lamarckian." It is very vigorously written, and will well repay the attention of representatives of either school of thought. Dr. Hartog fully admits that judges on this question differ. "From Alfred Russel Wallace, Ray Lankester, Thiselton Dyer, and Archdall Reid, we turn to Charles Darwin, George Romanes, Sydney Vines, Francis Darwin, K. Goebel, Wilhelm Roux, Oscar Hertwig, Yves Delage," and he claims that if a verdict has to be pronounced at this moment it must be "in favour of Lamarckian transmission as a factor in variation and evolution." We think, however, that no *twelve* unbiased and competent scientific jurymen could be found who would unanimously agree on a verdict at all. The question is still an open one, but Lamarck has been unduly depreciated, and will certainly come again to his proper recognition.

A scientific appreciation of the biological writings of Samuel Butler is somewhat of a snare. That versatile and clever writer almost put himself out of court by the extreme candour of his criticism and the freedom of his assertions, but nevertheless his books are still very much alive, and Dr. Hartog has given a very fair and judicial introduction to them.

Notes on some Common and Rare British Birds. By J. E. H. Kelso, M.D., &c. J. & J. Bennett, Ltd.

It almost seemed that there was neither room nor demand for another book on British Birds, but Dr. Kelso, in this handy sized volume of a little over four hundred pages, with its one hundred and thirty illustrations from photographs, has proved the contrary. It can be perused with pleasure from start to finish, because it has the bionomical charm; he has given his own observations, which are many and somewhat largely original, while he has read his contemporaries and culled much from them (names and references being given). Very much of the material is derived from experience on Hayling Island. We shall not say again that nothing more can be added to the literature of our British Birds.

BRITISH 3 JUL 13 MUSEUM